CĂTĂLINA CANGEA

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PERSONAL PROFILE

Research Scientist at DeepMind, currently working on multimodal and long-range generative methods. I am best motivated when using ML to solve challenging real-world applications. Obtained my PhD at the University of Cambridge, with thesis '*Exploiting multimodality and structure in world representations*'.

PREVIOUS PROFESSIONAL EXPERIENCE

Research Scientist Internship—DeepMind   July 2020–November 2020
Hosted by Piotr Mirowski in the Robotics, Embodied Agents and Lifelong learning (REAL) team led by Raia Hadsell.

ML Research Consultancy—Relation Therapeutics   June 2020–July 2020
Developing (graph-)ML solutions to aid in drug development and repurposing efforts.

AI Residency—X, the moonshot factory   May 2019–August 2019
Worked on an early-stage project, adapting SoTA techniques to track changes in code. Patent issued.

ML Research Internship—Mila   July 2018–September 2018
Collaboration with Aaron Courville on a visual reasoning project which resulted in a novel benchmark and alternative perspective on EQA-style tasks. BMVC publication and NeurIPS ViGIL spotlight talk.

Software Engineer Internship—Facebook   June 2016–September 2016
Worked on the LogDevice team, making client operations on a distributed RocksDB data store more efficient and flexible, while leading to fewer system failures.

Software Engineer Internship—Facebook   July 2015–September 2015
Worked on iOS Product Infrastructure to reduce the time taken by the Facebook iOS app to load content close to the screen current view. Improved the infrastructure and network request prioritisation system.

Student Training in Engineering Program—Google   June 2014–September 2014
Added processing progress for video uploads on YouTube. Developed a JavaScript client implementation that requests processing information from the server and thumbnail rendering of processing videos.

SELECTED PUBLICATIONS

General-purpose, long-context autoregressive modeling with Perceiver AR (second)
Autoregressive architecture that can attend to over 100k tokens, bypassing the $O(N^2)$ complexity of Transformers. Strong performance and/or SoTA on image, language and music tasks. *ICML 2022*.

Message Passing Neural Processes (joint first)
Neural Process with relational inductive bias for structured datasets. Strong generalisation on Cellular Automata tasks, significant gains in arbitrary-labelling and few-shot tasks. *ICLR-W GTRL 2022*.

Deep Graph Mapper: Seeing Graphs through the Neural Lens (joint first)
A fusion between Mapper (Topological Data Analysis) and graph neural networks that produces highly informative graph visualisations and a powerful pooling layer. *Frontiers 2021, NeurIPS-W 2020 TDA*.

VideoNavQA: Bridging the Gap between Visual and Embodied QA (first)

Novel task that studies QA performance in EQA-like settings with nearly-ideal navigation paths. Generalised VQA models for temporal reasoning. *BMVC 2019, NeurIPS-W 2019 ViGIL* spotlight.

XFlow: Cross-modal Deep Neural Networks for Audiovisual Classification (first)

Cross-modal dataflow multimodal architectures. SOTA on benchmarks. *IEEE Transactions on Neural Networks and Learning Systems 2019, ARM Research Summit 2017, ICDL-EPIROB-W 2017 CMCML.*

EDUCATION

Department of Computer Science and Technology, University of Cambridge, UK

PhD in Machine Learning (10/2017–03/2021)   *No corrections (Examiners: Nic Lane, Xavier Bresson)*

MPhil in Advanced Computer Science (10/2016–07/2017)   *Distinction*

BA in Computer Science (10/2013–06/2016)   *First Class (final year)*

Colegiul Naţional "I.L.Caragiale", Ploieşti, România

Computer Science & Mathematics (09/2009–05/2013)   *Valedictorian*

EXTRACURRICULAR ACTIVITIES

Organiser, ViGIL Workshop, North American Chapter of the ACL 2021   2020–June 2021

Machine Learning Teaching Fellow, Cambridge Spark   May 2018–May 2021

Chair/Deputy Chair, women@CL, University of Cambridge   October 2018–July 2020

ACADEMIC TEACHING / SUPERVISING

Lectures: *Graph Generation and Probabilistic Methods - R250 Advanced Topics in ML and NLP (Master's course)* (2021), *Graph Generation Methods - R250* (2020)

Master's projects: *Machine Unlearning* (2020–21), *Structure-aware Generation of Molecules in Protein Pockets* (2020–21), *Goal-conditioned Reinforcement Learning in the Presence of an Adversary* (2019–20, NeurIPS-W DeepRL), *Representation Learning for Spatio-Temporal Graphs* (2018–19, ICLR-W RLGM), *Dynamic Temporal Analysis for Graph Structured Data* (2018–19, ICLR-W RLGM)

Undergraduate projects: *Benchmarking Graph Neural Networks using Wikipedia* (2019–20, ICML-W GRL+ spotlight), *Multimodal Relational Reasoning for Visual Question Answering* (2019–20), *The PlayStation Reinforcement Learning Environment* (2018–19, NeurIPS-W DeepRL), *Deep Learning for Music Recommendation* (2017–18)

Courses: AI, Databases, Discrete Maths, Foundations of CS, Logic & Proof, ML & Real-World Data

PROFESSIONAL SKILLS

Programming Languages   Python, C, C++, Standard ML, Java, C#, Objective-C, JavaScript
Machine Learning APIs   PyTorch, JAX, Keras, TF1, PyG, Haiku, Graph Nets, Sonnet, CUDA

LANGUAGES

English (fluent), French (beginner), Romanian (native)

INTERESTS

Music   Piano, guitar, vocals; live performances, recording (Native Instruments, Ableton Live)
Sports   Rowing (Darwin/King's College 2nd/1st VIII) ('16–'21), cycling, yoga